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WHAT DRIVES INDIA'S FINANCIAL INTEGRATION?

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ABSTRACT

We explore the determinants of Financial Integration (FI) in the Indian context from 1996Q2-2018Q4. Using a newly constructed quarterly financial integration index based on the stock of external assets and liabilities position and a range of econometric methodologies, we find that a structural factor (trade openness) and an institutional factor (institutional quality) drive financial integration in India. Our findings also show the importance of exchange rate volatility, global growth rate, and global interest rate in determining India's financial integration. These findings have crucial implications in designing the policy framework for achieving higher financial integration in India.

Keywords: Financial integration; Determinants; Trade openness; Institutional quality; ARDL.
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I. INTRODUCTION

During the last three decades, the world has observed an unprecedented rise in the speed and degree of Financial Integration (FI) (Lane and Milesi-Ferretti, 2007; 2017). [1] Many emerging economies have lifted the restrictions on capital and current account transactions, resulting in several benefits like higher economic growth, lower inflation, and international risk-sharing. However, financial frictions have restricted the free flow of capital across countries (Eichengreen and Chul, 2003; Johnson, 2007; Vo and Daly, 2007; Furceri *et al.*, 2011). Further, imperfect substitutability of financial assets entails transactions costs (Martin and Rey, 2000, 2004) and information asymmetries not only prevent the diversification of portfolios but also enhance the fear of sovereign default (Rose and Spiegel, 2002; Portes *et al*., 2001; Portes and Rey, 2005; Choi *et al*., 2014) among economies. Therefore, most economies are still unable to fulfil the necessary amount of capital to finance their domestic investment, and hence, incapable of reaping benefits from the integration process.

With the experience of the Global Financial Crisis (GFC), it is difficult to ignore the adverse effects of *FI* in terms of the financial crisis, contagion, and macroeconomic volatility in the presence of potential benefits (Kose *et al*., 2006, 2009; Padhan and Prabheesh, 2019; Garg and Prabheesh, 2021). Apparently, the cost-benefit trade-off depends on how an economy integrates and the tools they adopt to beat the "Lucas Paradox" (Lucas, 1990), "Over Borrowing Syndrome" (McKinnon and Pill, 1996), default risk, and information asymmetry.[2],[3] As per the concern for benefits, a pragmatic approach to the integration will be crucial to maintain macroeconomic stability and achieve higher *FI*.[4]

Although emerging economies adopt capital account openness and offer higher interest rates as their policy to *FI*, however, these cannot guarantee the inflows of capital to an economy. In the light of the Lucas Paradox and over-

[1] The Reserve Bank of India (2007) defined financial integration as a process of unifying the financial markets in a proper way that risk adjusted returns on financial instruments of different countries should be equal when returns are expressed in a single currency. Financial integration and financial globalization is simultaneously used in the paper. Further, the short form FI is used for financial integration in this paper.

[2] Lucas (1990) inquired 'why does not capital flows from the rich countries to poor countries' and found that capital does not flow from the capital rich countries to capital scarce countries even if the capital scarce countries provide higher rate of return due to lack of institutional quality, political risks, and capital market imperfections.

[3] McKinnon and Pill (1996) argued that even if in the early stages of financial integration, poor countries may attract higher capital inflow from abroad, capital may later fly out from that country due to lack of institutional quality and weak financial systems. In this case, both foreign and domestic capital will fly out from the country. In this situation, hike in domestic interest rate may not be able to control the capital outflow. Further, the weak financial system and low institutional quality along with full open capital account may drive a country into financial crisis. The East Asian financial crisis 1997-98 is a major example of this syndrome.

[4] It covers four main points for best policy options before full capital account convertibility: (1) not all countries are ready for full capital account openness; (2) strengthening of institutions raise the economic sustainability even when global downturn happens; (3) encouraging international portfolio diversification by the investors rather than central bank intervention, sterilization of the inflows, and accumulation of forex; (4) control of private sector outflows in the early stages of financial liberalization (Prasad and Rajan, 2008).

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borrowing syndrome, several factors, such as institutional quality, the efficiency of the financial system, and healthy macroeconomic condition etc., perform a pivotal role in driving the *FI* of an economy.

We can trace the determinants of *FI*, such as trade openness, financial development, institutional quality, law and order, inflation, exchange rate regime, fiscal deficit, tax rate, internet, technology, language, border, interest rate differential and central bank independence etc., from the empirical literature (Grilli and Milesi-Ferretti, 1995; Lemmen and Eijffinger, 1996; La Porta *et al*., 1997; Lane, 2000; Portes *et al*., 2001; Lane and Milesi-Ferretti, 2003, 2008; Prasad *et al*., 2003; Vo and Daly, 2007; Ananchotikul *et al*., 2015; Bhattacharya and Ghosh, 2016; Alotaibi and Mishra, 2014, 2017; Bhattacharya *et al*., 2018). However, each factor has a different effect on the economy, leading to *FI*. Most of the empirical literature has focused on cross-country analysis or groups of economies, and paid less attention to country-specific analysis. Hence, the identified factors may not be relevant to the individual economy. Further, the ambiguous findings raise the difficulty in choosing potential determinants of *FI* for emerging economies. For instance, Alesina *et al*. (1993) and Arfaoui and Abaoub (2010) emphasized the role of interest rates in driving *FI*. In contrast, Verma and Prakash (2011) affirmed the insensitiveness of Foreign Direct Investment (FDI) and Foreign Institutional Investor (FII) equity flows to the interest rate. Conclusively, there is a lack of uniformity on how an economy should integrate with the world and choose factors to attract foreign capital flows into the economy. Furthermore, the available literature failed to classify the determinants into structural variables, policy variables, institutional variables, and global variables and to state their relative importance in driving *FI*. Finally, none of the extant studies look into the factors that drive *FI* in emerging economies like India. Thus, the present study fulfils the research gap.

Our study aims to explore the determinants of *FI* in the case of India. We choose India as a case study because (1) India targets progressive opening of the capital account and follows a gradual path toward *FI* (Garg and Prabheesh, 2018; Padhan and Prabheesh, 2020; Padhan *et al*., 2022), (2) in the new world economic structure, India (one of the Asian Giants) occupies a crucial place with the increasing weight of trade shares globally, and (3) India has emerged as a fast-growing economy (see also Iyke, 2020). Hence, this study will help the policy-makers embark on successful initiatives to integrate the Indian financial system with the world and reap the benefits from the integration process.

Our approach for the study is as follows: (1) we construct a quarterly measure of *FI*, following Lane and Milesi-Ferretti (2007) for the Indian economy; (2) we identify the drivers of *FI* from the literature related to the Lucas Paradox, over-borrowing syndrome, default risk, and information asymmetry; (3) then, we follow Lemmen and Eijffinger (1996) and classify the factors into several sub-categories, including structural variables, policy variables, institutional variables, and global variables. The appropriate classification of the driving forces of *FI* would be crucial to frame appropriate policies for the Indian economy; (4) the global factors are included to explore the role of the world's performance opportunities on India's *FI*; (5) we use the AutoRegressive Distributed Lag (ARDL) model to examine the determinants of *FI* in the Indian context; and (6) finally, we utilize the Dynamic Ordinary Least Square (DOLS) method to perform robustness checks.

The empirical findings are as follows: (1) a structural factor like trade openness, and an institutional factor like institutional quality play a major role in driving *FI* in the Indian context; and (2) the findings also show the importance of exchange rate volatility, global growth rate, and global interest rate in determining India's *FI*. The results from the DOLS analysis is consistent with those from the ARDL analysis.

We contribute to the literature on the following grounds. First, this may be the first study to examine the determinants of *FI* in India's case. Being an emerging economy, India has maintained stable economic growth and financial stability during the phase of global downturn earlier. Indeed, it is crucial to explore the factors that determine India's *FI*. Second, following Lane and Milesi-Ferretti's (2007) TOTAL Index, we constructed a quarterly TOTAL index of *FI* for India using stock of external assets and liabilities position. This measurement is less prone to measurement error and is insensitive to price and exchange rate fluctuations (Padhan and Prabheesh, 2022). To the best of our knowledge, it is the first study to use a quarterly *FI* index based on the stock of external assets and liabilities for the Indian economy. Third, our results are more robust and efficient as we focus on time-series analysis and stock-based *FI* index. Fourth, our results are in line with Portes and Rey (2005), who suggest that trade in goods and services reduces information asymmetry and promotes trade in assets. Finally, our findings complement with Lucas (1990) and McKinnon and Pill (1996), who emphasize the role of institutional quality in attracting capital inflows and mobilizing resources to productive activities.

The rest of the paper is structured as follows. Section II presents the empirical model, data and methodology. Section III reports the empirical findings and discussion. Section IV concludes with policy implications.

II. EMPIRICAL MODEL, DATA AND METHODOLOGY

A. Empirical Model and Data

We follow Lemmen and Eijffinger (1996), Vo and Daly (2007), and Alotaibi and Mishra (2017) to construct an empirical model of *FI* for the Indian context. The empirical model is as follows.

$$FI_t = \alpha_0 + \beta_1 TO_t + \beta_2 FDV_t + \beta_3 EXV_t + \beta_4 FD_t + \beta_5 IQ_t + \beta_6 GG_t + \beta_7 GI_t + \varepsilon_t \quad (1)$$

where *FI*, the dependent variable, denotes financial integration. Similarly, independent variables *TO*, *FDV*, *EXV*, *FD*, *IQ*, *GG*, and *GI* stand for trade openness, financial development, exchange rate volatility, fiscal deficit, institutional quality, global growth rate, and global interest rate, respectively. All variables are measured in logarithmic form (*ln*). The $\beta_1,\ldots,\beta_7$ are the parameters to be estimated and β_0 is the intercept. *t*, and ε denote time and error term, respectively. Here, *TO* and *FDV* are considered as structural variables, *EXV* and *FD* as policy variables, and *IQ* as

an institutional variable. Similarly, *GG* and *GI* are incorporated in the model as global variables.[5] The variable measurement and their expected relationship with *FI* are reported in Table 1.

Table 1.
Definition and Measurement of Variables

The table reports the determinant variables, construction, expected effect, channels and evidence from the empirical literature. Source: Author's Compilation.

Dependent Variable					
Variable	**Acronym**	**Measurement**			
Financial Integration	*FI*	Ratio of stock of external assets and liabilities to GDP			
Independent/Explanatory Variables					
Variables Type	**Acronym**	**Measurement**	**Expected Effect**	**Logic/Channel**	**Evidence from Prior Studies**
Structural Variables					
Trade Openness	*TO*	Ratio of Sum of Exports and imports of goods and services to GDP	+	Complementary Information Symmetry Familiarity Effect Reduce default risk	Lane (2000) Obstfeld and Rogoff (1996) Portes and Rey (2005) Rose and Spiegel (2002)
Financial Development	FDV	*M2/GDP*	+	Financial intermediation Enhanced competition Foreign exposure Move financial integration	Von Furstenberg, (1998) Lane and Milesi-Ferretti (2003) Mishra and Daly (2006)
Institutional Variables					
Institutional Quality	*IQ*	Sum of five aspects: corruption, democratic accountability, investment conditions, law and order and socio-economic condition	+	Credibility controls Ethical infrastructure Dependence rights dependence	Von Furstenberg (1998) La Porta *et al*. (1997, 1998) Johnson (2007) Vo and Daly (2007)

[5] Considering the fact that the world's largest economy, the US, could explains the global activity. The rise or fall in US growth rate and interest rate will condition the cross-border financial flows, stock market capitalization, and liquidity across economies. Further, a study by Rey (2016) confirmed the global impact of changes in the US monetary policy. Hence, we consider growth rate of the GDP, and the 91-day treasury bill rate of the US as proxy for global factors.

Table 1.
Definition and Measurement of Variables (Continued)

Independent/Explanatory Variables					
Variables Type	**Acronym**	**Measurement**	**Expected Effect**	**Logic/Channel**	**Evidence from Prior Studies**
Policy Variables					
Exchange Rate Volatility	*EXV*	Five quarter rolling standard deviation	-	Portfolio diversification Unfavorable condition Segmentation of financial assets	Grilli and Milesi-Ferretti (1995) Furceri *et al*. (2011) Alotaibi and Mishra (2017)
Fiscal Deficit	*FD*	Ratio of Fiscal deficit to GDP	-	Competition over tax rate Offshore transaction to reap benefits Tax burden avoidance	Lane and Milesi-Ferretti (2003) Arfaoui and Abaoub (2010)
Global Variables					
Global Growth rate	*GG*	US GDP growth rate as proxy	-	Default risk probability Capital flows	Edition *et al*. (2002) Vo and Daly (2007)
Global Interest rate	*GI*	US Treasury bill rate as proxy	-	Capital outflows Investment	Arfaoui and Abaoub (2010)

Following Lane and Milesi-Ferretti (2007), we constructed a quarterly TOTAL index for India as:

$$TOTAL_{it} = \frac{FDIA_{it} + PEQA_{it} + PDQA_{it} + FDIL_{it} + PEQL_{it} + PDQL_{it} + (RESERVES - GOLD)_{it}}{GDP_{it}} \quad (2)$$

where $FDIA_{it}$, $PDQA_{it}$ and $PDQA_{it}$ are the stock of FDI assets, portfolio equity assets, and portfolio debt assets of country *i* abroad in time *t*, respectively. $FDIL_{it}$, $PEQL_{it}$, and $PDQL_{it}$ are the stock of FDI liabilities, portfolio equities liabilities, and portfolio debt liabilities of the rest of the world of country *i* abroad in time period *t*, respectively.

The quarterly TOTAL index is constructed using the international investment position data published by the Reserve Bank of India. The stock data is capable of representing economies' integration globally better than the flow data because these are less volatile from the yearly fluctuations and less prone to measurement errors (Padhan and Prabheesh, 2022).

We utilized quarterly data from 1996Q2-2018Q4 for Indian Economy. Data have been collected from various sources, such as the Reserve Bank of India, International Financial Statistics, OECD Accounts and CEIC Database.[6]

B. Methodology

We use the Augmented Dickey-Fuller Test (ADF Test), Phillips-Perron (PP Test), and Narayan-Popp Unit root test with structural break (NP Test) to test the stationary properties of variables before looking at the driving forces of *FI*. We tested for structural breaks in the data series as these standard unit root tests do not consider the possibility of the structural break(s) and, hence, may yield false results in the presence of structural breaks. We applied the Narayan and Popp (2010) unit root test, which accounts for the two endogenous breaks in the series. It has advantages over Lumsdaine and Papell (1997) and Lee and Strazicich (2003). It uses the Dickey-Fuller-type test approach and chooses the break date by maximizing the break dummy coefficients. Further, it is invariant to the break's magnitude and has good size and power properties (Narayan and Popp, 2013). The Narayan and Popp test proposed two models M1 and M2 by allowing two breaks in the levels and two breaks in the trend.

Next, to investigate the determinants of *FI* in the Indian context, we use the ARDL approach to cointegration. It has an advantage over typical integration techniques that it can handle a mix of I(0) and I(1) (Pesaran and Shin, 1999; Pesaran *et al*., 2001). The ARDL approach to cointegration involves two steps. The first step is to identify the presence of cointegration. If cointegration is established, the next step is to estimate the long and short-run coefficients using error correction models.

To identify the long-run relationship, we used a *F*-test of the joint significance of the coefficients. Lower and higher critical values for the *F*-statistics were proposed by Pesaran *et al*. (2001), assuming that all variables are I(0) for the lower bound and I(1) for the upper bound. If the estimated *F*-statistic exceeds the upper critical value, there is evidence of cointegration; if it does not, there is no evidence of cointegration. The result is inconclusive if the calculated value falls between the lower and upper critical levels. Narayan (2005) offered us critical values for small samples. Once the cointegration is achieved, the vector error correction framework may be used to determine the long and short-run coefficients. As ARDL assumes no serial correlation, a suitable lag duration (m) must be chosen.

Next, for the robustness checks, we utilize the Dynamic Ordinary Least Squares (DOLS) approach developed by Saikkonen (1991) and Stock and Watson (1993). It has the advantage that the endogeneity of any of the regressors does not affect the robustness of estimates asymptotically and can also be used directly to estimate with the mixture of I(0) and I(1) variables.

[6] We aim to utilize publicly available data for the study. The quarterly data availability of variables restricted us to choose the above time span for the empirical analysis. Further, due to occurrence of COVID-19 pandemic, the update of specific datasets was fettered, which indirectly forbid us to extend our data period.

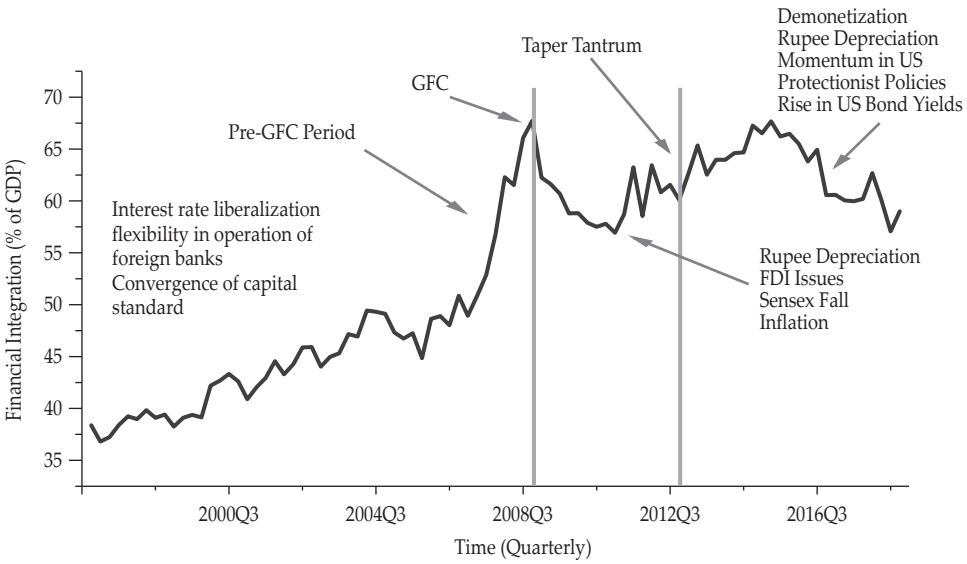
III. EMPIRICAL FINDINGS

A. Graphical Analysis: Trends and Phases of India's Financial Integration

Figure 1 plots the quarterly TOTAL *FI* index for the period 1996Q4-2018Q4. The figure shows that India's level of *FI* is on an upward trend, and reached its peak during 2007-08, and declined thereafter. Broadly, the trend can be divided into three phases. The first phase (1996Q4-2008Q3) witnessed a rise in India's *FI* until the occurrence of the GFC. This rise in India's level of *FI* is due to interest rate liberalization, more flexibility in the operation of foreign banks, and international convergence of capital standards. In the second phase (2008Q4-2013Q2), India witnessed a fall in *FI* after the GFC and slowly evolved after. During this period, the country experienced capital outflows, currency depreciation, FDI retail issues, a fall in stock price, and higher inflation. In the third phase (2013Q3-2018Q4), after the taper tantrum, India's level of *FI* slowly rises and then witnesses a decline. This decline in the third phase could be due to the capital outflows in both debt and equity markets from the Indian economy. Further, the momentum gains, adoption of protectionist policies, and rise in US bond yields urged the investors to withdraw their capital from emerging markets, which could have contributed to the decline in India's *FI*.

Figure 1.
Quarterly TOTAL Index for India

The figure exhibits India's level of financial integration and its phases during 1996Q2-2018Q4.



B. Unit Root Test Results

The ADF and PP unit root test results are provided in Table 2. The conventional unit root tests such as ADF and PP show that Financial Integration (*FI*), Trade Openness (*TO*), Financial Development (*FDV*), and Institutional Quality (*IQ*)

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are stationary at first-difference. In contrast, Exchange Rate Volatility (*EXV*) and Global Growth rate (*GG*) are level stationary. The unit root properties of Fiscal Deficit (*FD*) and Global Interest rate (*GI*) remain inconclusive.

Table 2.
Conventional Unit Root Test Results

This table reports the conventional unit root test results. Here, we compare the critical value tabulated by MacKinnon (1994, 1996). *,**, and *** stand for 1%, 5%, and 10% significance level, respectively.

Variables	ADF		PP		Results
	Level	1st Difference	Level	1st Difference	
Dependent Variable					
FI	-2.242	-10.682*	-2.667	-10.528*	I(1)
Structural Variables					
TO	-0.819	-9.041*	-0.761	-9.117*	I(1)
FDV	-2.486	-9.011*	-2.610	-10.172*	I(1)
Policy Variables					
EXV	-3.824**	-5.097*	-3.281***	-8.844*	I(0)
FD	-2.500	-16.934*	-8.762*	-26.108*	I(0)/I(1)
Institutional Variable					
IQ	-1.843	-2.637*	-1.855	-8.782*	I(1)
Global Variables					
GG	-6.384*	-15.156*	-6.502*	-21.965*	I(0)
GI	-3.509**	-4.476*	-1.858	-4.604*	I(0)/I(1)

As the conventional unit root test are of low power in the presence of structural breaks, we perform NP structural break unit root test and the results are provided in Table 3.

Table 3.
Narayan-Popp Unit Root Test Results

The critical values are taken from Narayan and Popp (2010, pp. 1429), and *, ** and *** represent the 1%, 5%, and 10% significance levels.

	M1: Two Breaks in Intercept				M2: Two Breaks in Intercept and Trend			
Variables	**Lag**	***t*-stat**	**TB1**	**TB2**	**Lag**	***t*-stat**	**TB1**	**TB2**
Dependent Variable								
FI	1	-0.358 (-2.799)	2007Q4	2008Q4	1	-0.424 (-3.220)	2007Q4	2008Q4
Structural Variables								
TO	0	-0.061 (-1.163)	2008Q3	2012Q3	0	-0.350 (-3.890)	2008Q4	2012Q3
FDV	0	-0.069 (-2.501)	2007Q4	2008Q4	0	-0.318 (-3.396)	2004Q2	2008Q4
Policy Variables								
EXV	5	-0.488 (-5.220)*	2008Q3	2013Q2	5	-0.575 (-4.740)**	2008Q3	2013Q2
FD	5	-0.358 (-5.128)*	2008Q2	2010Q4	3	-1.417 (-4.437)	2008Q2	2010Q3
Institutional Variable								
IQ	4	-0.116 (-2.239)	2001Q1	2003Q3	4	-0.108 (-2.066)	2001Q1	2003Q3
Global Variables								
GG	1	-0.611 (-5.456)*	2007Q4	2008Q3	0	-0.898 (-8.920)*	2003Q2	2008Q3
GI	2	-0.107 (-3.527)	2000Q4	2008Q3	2	-0.110 (-3.516)	2000Q4	2008Q3

Table 3 shows that unit root results based on structural breaks, i.e., NP test, which reveals that null of unit root cannot be rejected for all cases except for Exchange Rate Volatility (*EXV*), Fiscal Deficit (*FD*) and Global Growth rate (*GG*). Looking at the date of structural breaks, most of the break dates occurred around the GFC in 2008-09. Overall, in most cases, the structural breaks are consistent with the GFC event and post-crisis restoration. We have included two dummies as per the Narayan-Popp structural break test findings for estimation.

C. ARDL Cointegration Results

We then used the ARDL methodology to check if there is a long-run relationship between *FI* and its driving factors. The Bound Test results are given in Table 4. The results clearly show that the null hypothesis of no cointegration is rejected at 1% significance level, which implies that there exists a long-run relationship between *FI* and its determinants.

Table 4.
Bound Test Results

The critical values are obtained from (Narayan, 2005). Where *, **, and *** represent 1%, 5% and 10% significance level respectively.

Critical Value Bounds of the F-Statistics							
		90%		**95%**		**99%**	
N	Lag	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
90	1	3.113	3.610	3.740	4.303	5.157	5.917
Calculated F-Statistics (With Structural Breaks)							
(*FI* | *TO, FDV, EXV, FD, IQ, GG, GI*)						6.188*	Cointegrated

After establishing cointegration between FI and its determinants, the ARDL specification is used to estimate the long-run coefficients of the model, and then the short-run coefficients are estimated through the error correction procedure. The findings are reported in Table 5.

Table 5.
Long-run and Short-run Coefficients from ARDL Model

The table reports the long-run and short-run coefficients from the ARDL cointegration. Here, *D1* and *D2* represent the dummy variables assigned to the model based on Narayan-Poop unit root test results. Further, *D* and ecm_{t-1} denote first difference and the error correction term, respectively. The LM statistics for serial correlation, normality and heteroscedasticity, in residuals are represented by F_{Auto}, $J\text{-}B_{Norm}$, *and* F_{BPG}, respectively. *, ** and *** represents the significance at 1%, 5% and 10% respectively. Further, the figures in parenthesis and square brackets are *t*-statistics and *p*-values, respectively.

Variables	**Coefficient**
Long-run Coefficient	
C	0.954 (1.306)
TO	0.105 (2.179)**
FDV	0.096 (0.762)
EXV	-0.021 (-2.163)**

Table 5.
Long-run and Short-run Coefficients from ARDL Model (Continued)

Variables	Coefficient
FD	-0.001 (-0.339)
IQ	0.513 (2.410)**
GG	-0.026 (-1.811)***
GI	-0.016 (-2.622)**
D1	0.126 (4.445)*
D2	0.001 (2.208)**
Short-run Coefficient	
D(FI(-1))	0.166 (1.600)
D(FI(-2))	0.602 (5.230)*
D(FI(-3))	0.481 (5.030)*
D(TO)	-0.155 (-2.597)**
D(EXV)	-0.037 (-5.286)*
D(IQ)	0.827 (0.875)*
D(IQ(-1))	0.824 (2.340)**
D(IQ(-2))	0.544 (0.621)**
D(GG)	-0.055 (-1.206)
D(GG(-1))	0.019 (3.309)*
D(GG(-2))	0.018 (3.598)*
D(GI)	0.007 (0.907)
D(GI(-1))	0.009 (1.119)
D(GI(-2))	-0.035 (-4.179)*
ecm_{t-1}	-0.802 (-3.598)*
Diagnostics	
Adjusted R^2 0.481	
F_{Auto} 0.526 [0.593]	
$J\text{-}B_{Norm}$ 1.717 [0.423]	
F_{BPG} 1.363 [0.166]	

First, it can be observed that the long-run estimated coefficients of the structural variable, Trade Openness (*TO*), is 0.105 and significant, implying that an increase in trade openness by 1% leads to an increase in *FI* by 0.105%. This can be due to the fact that the higher trade openness reduces the information asymmetry and default risk for an economy, which can foster the level of *FI*. Further, a higher trade openness shows the country's ability to execute financial transactions across borders, which is crucial in reducing home biasedness (Lewis, 1999). Similarly, a higher trade openness also helps the country to service its debt effectively as compared to a closed economy (Portes and Rey, 2005). Apparently, investors prefer highly trade open economies to avoid information asymmetry, enjoy the familiarity effect and secure default risk. Similar arguments were reported by Portes *et al*. (2001), Rose and Spiegel (2002), and Portes and Rey (2005), who affirmed that higher trade openness increases the familiarity effect and reduces the information asymmetry and default risk. However, financial market development (*FDV*), another structural variable, is found to have a positive effect on *FI* but not statistically significant in the long-run model.

Second, among policy variables, the Exchange Rate Volatility (*EXV*) is only found to be statistically significant in the long-run model. The associated coefficient is found to be -0.021 implying that higher exchange rate variation adversely affects the level of *FI* in India. Although the impact of the *EXV* on *FI* is very marginal, the economic implication of the statistical significance reveals the relevance of the non-substitutability of financial assets. In other words, the higher exchange rate volatility causes segmentation between the financial assets and reduces the substitutability of financial assets in the market. Further, it reduces the demand for risky assets as investors prefer to hold less risky assets for portfolio diversification and enjoy the benefits of integration. Hence, exchange rate volatility acts as an obstacle in achieving a higher level of *FI* for the Indian economy.

Third, the impact of the institutional variable, Institutional Quality (*IQ*) is found to be positive and statistically significant. The long-run estimate is 0.513, imply that 1% increase in institutional quality leads to 0.513% increase in the level of *FI*. The high value of the coefficient indicates the major role played by the institutional quality in the process of *FI*, i.e., higher institutional quality generates mutual confidence and forms reputation capital (La Porta *et al*., 1998). A high institutional quality boosts institutional security, creditability control and ethical infrastructure, which positively leads to *FI* by reducing the risk of default and improving legal security for the creditors. Further, stronger institutional quality reduces the probability of over-borrowing syndrome and the Lucas paradox. A similar finding was reported in Von Furstenberg (1998), La Porta *et al*. (1998) and Vo and Daly (2007).

Finally, the findings also reveal the role of global variables such as Global Growth rate (*GG*) and Global Interest rate (*GI*). Both variables are found to be statistically significant in the model but their impact on *FI* is found to be marginal. For instance, the long-run impact of *GG* is found to be -0.026 and negative. This finding is attributed to the fact that a rise in global growth leads to capital outflows from emerging economies, which subsequently reduce the level of *FI*. This finding is similar to Edition *et al*. (2002), who affirmed that a fall in global growth rate drives the capital inflows to the emerging economy and vice versa. Similarly, the long-run coefficient of the Global Interest rate (*GI*) is -0.016, imply a rise in the global interest rate inhibits higher *FI* for the Indian context. The rise in the global interest rate will reduce the return margins associated with the emerging economies, leads the capital outflows from those economies, which reduce the overall liabilities holdings and *FI*. Studies by Bekaert *et al*. (2002) and Arfaoui and Abaoub (2010) affirmed that rising global interest rates cause capital outflows from emerging economies. Finally, both dummies used to capture the structural breaks are statistically significant.

The findings from the short-run relationship are slightly different from the long-run. For instance, the Trade Openness (*TO*) exhibits a negative sign and significant, indicating that a higher trade openness reduces *FI* in the short run. This finding could be attributed to the domestic economy's short-term vulnerability to terms of trade shocks, which raises concerns about the sustainability of external debt. Similarly, the Global Growth rate (*GG*) is found to have a positive and significant impact in contrast to the long run. Further, the findings also reveal the highest role of Institutional Quality (*IQ*) in achieving a higher level of *FI* in the

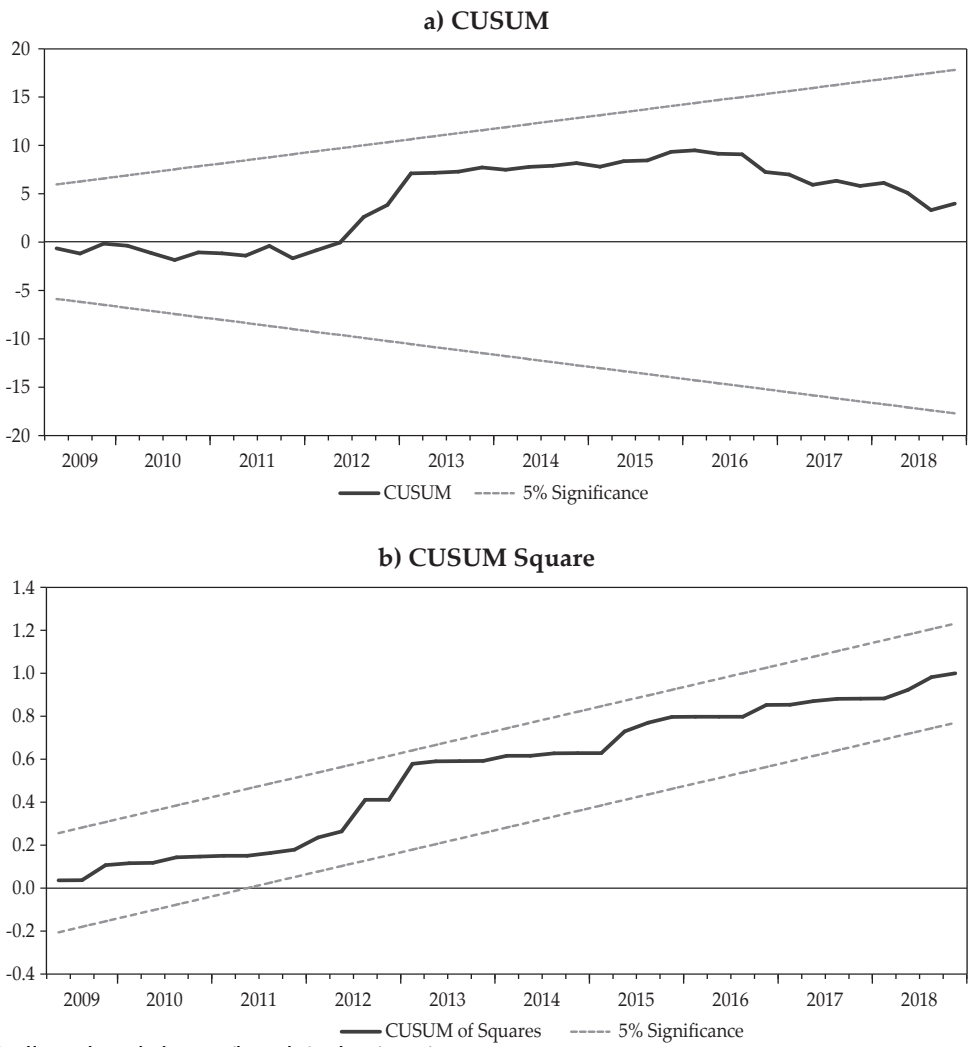
short run. The calculated error correction term (ecm_{t-1}) is -0.802, implying that 80 percent of the divergence from equilibrium is erased in a quarter of the time.

We perform several diagnostic tests, including autocorrelation, normality, and heteroscedasticity in the error term. In the error term, we noticed no evidence of autocorrelation. The Jarque-Bera normality test shows that the errors are normally distributed with no heteroscedasticity in the model. As a result, we may say that the model is well behaved.

Figure 2 shows the recursive residuals-based cumulative sum (CUSUM) and cumulative sum of squares (CUSUMQ), which do not reveal any signs of model instability.

Figure 2.
Plot of Cumulative Sum of Recursive Residual (CUSUM) and Cumulative Sum of Square of Residuals (CUSUM of square)

The figure 2 shows the cumulative sum of recursive residual and cumulative sum of square of residuals.



D. Dynamic Ordinary Least Square Results

We performed the Dynamic Ordinary Least Squares Method (DOLS) to check the sensitivity of the empirical findings reported in the earlier results. The results reported in Table 6 from the DOLS analysis is consistent with the findings from the ARDL.

Table 6.
Results from the Dynamic Ordinary Least Square (DOLS)

The table reports the findings from the dynamic ordinary least square analysis. Here, *, ** and *** represents the significance at 1%, 5% and 10% respectively. Further, the figures in parenthesis and square brackets are *t*-statistics and *p*-values, respectively.

Dependent Variable *FI*	
Variables	**Coefficients**
TO	0.179
	(3.407)*
FDV	0.055
	(0.643)
EXV	-0.193
	(-2.059)**
FD	-0.093
	(-1.098)
IQ	0.309
	(2.351)*
GG	-0.023
	(-2.091)**
GI	-0.036
	(-2.117)**
D1	4.912
	(3.122)*
D2	0.151
	(3.375)*
Constant	-0.783
	(-5.043)*
Adjusted R^2	0.600
Normality	2.541
	[0.280]

The major findings of the study can be summarized as follows: (1) the structural factor (trade openness) and institutional factor (institutional quality) play a major role in driving financial integration in the Indian context; and (2) the findings also established the important role of policy variables (exchange rate volatility) and global factors (global growth rate and global interest rate) in determining India's financial integration.

IV. CONCLUSION AND POLICY IMPLICATIONS

The identification of potential determinants of *FI* plays a crucial role in maintaining macroeconomic stability and achieving higher *FI*. From a policy perspective,

potential determinants of *FI* will help in achieving a higher level of *FI* and reaping the benefits from the integration process. In this paper, we explore the determinants of *FI* in the Indian context. From the empirical analysis, we found that higher trade openness (structural factor) and institutional quality (institutional factor) lead to higher *FI* by reducing the probability of default risk, over-borrowing syndrome, and the Lucas Paradox. Hence, policymakers should design policies to promote higher trade and strengthen institutional quality to achieve a higher level of financial integration in India.

Furthermore, our findings established the crucial role of exchange rate volatility, global growth rate, and global interest rate, which imply the need for exchange rate stability and for appropriate policies to safeguard the Indian financial system from the external shocks, which will assist in maximizing financial integration.

One limitation of our study is that it focuses on one emerging economy, India, and its data period is limited to the pre-COVID-19 period. Hence, our study opens up an avenue for future research. This study can be extended to other emerging economies. Further, as our data covers up to the pre-COVID-19 period, it will be very interesting to check the role of COVID-19 on the level of financial integration in light of the evidence already documented showing that COVID-19 affects the financial and economic systems; see survey articles by Padhan and Prabheesh (2021), Phan and Narayan (2020) and Narayan (2021).

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